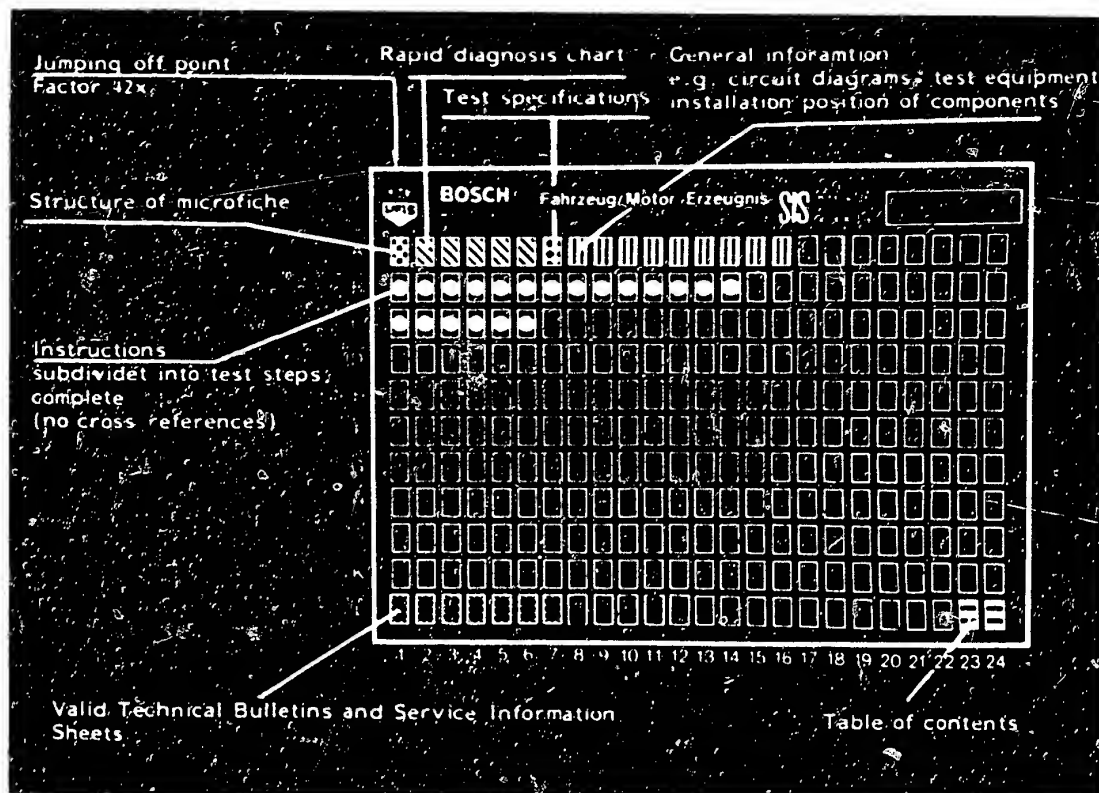


## Structure of microfiche

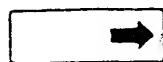


1. Read from left to right
2. Title of microfiche (appears on each coordinate)

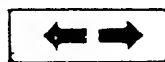
|             |                            |  |
|-------------|----------------------------|--|
| <b>E 16</b> | Product/assembly/test step |  |
|             | Vehicle/engine             |  |

Coordinate

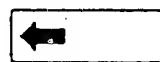
3. Limits of section



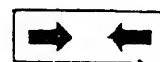
Beginning



Mid-section



End



One-page section

4. References to relevant test steps in test specifications; coordinate e.g. C6

**C 6**

**A1**

Trouble-shooting program



## 1. Rapid diagnosis chart

The following rapid diagnosis chart makes it possible for the experienced expert to quickly check the electrical/electronic part of the ignition system using normal workshop test equipment.

The rapid diagnosis chart contains the following information:

- Customer complaint
- Cause of the trouble
- Test instructions (if no coordinate given on the right, further possibilities for testing are indicated).
- Coordinates for detailed trouble-shooting.

If detailed information and instructions on trouble-shooting are necessary, always proceed according to the trouble-shooting program starting on coordinate B 1.



# Rapid diagnosis chart

Customer complaint (symptom of trouble)

1. Starting motor operates, but engine fails to start

2. Rough idling

3. Poor throttle response

4. Engine lacks power

5. Misfiring

6. Fuel consumption too high

7. Engine pings when accelerating

8. Backfiring

9. Engine becomes too hot

Cause of trouble

Test instructions

Coordinate

|   |   |   |   |   |   |   |   |   |                                |   |     |
|---|---|---|---|---|---|---|---|---|--------------------------------|---|-----|
| ● | ● | ● | ● | ● | ● |   | ● |   | Spark plugs defective          | Assess using ignition oscillograms or remove spark plug and make visual examination.  | -   |
| ● | ● | ● | ● | ● | ● | ● | ● | ● | Ignition timing incorrect      | See Autodata test specifications  | -   |
| ● | ● | ● | ● | ● |   |   |   |   | Shunt on secondary side        | Assess ignition coil, ignition distributor, ignition harness and spark plug using ignition oscillogram or make visual examination.            | -   |
| ● | ● | ● | ● | ● |   |   |   |   | Open circuit on secondary side | Assess ignition coil, ignition distributor, ignition harness and spark plug using ignition oscillogram, or test for continuity using ohmmeter | -   |
| ● |   |   |   |   |   |   |   |   | Open circuit on primary side   | Test voltage supply to trigger box or test primary circuit  | C 3 |
| ● | ● | ● | ● | ● |   |   |   |   | Ignition coil defective        | Make visual examination, electrical test  | B 5 |

**A3**

Rapid diagnosis chart

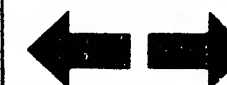
Opel



**A4**

Rapid diagnosis chart

Opel



# Rapid diagnosis chart

Customer complaint (symptom of trouble)

1. Starting motor operates, but engine fails to start
2. Rough idling
3. Poor throttle response
4. Engine lacks power
5. Misfiring
6. Fuel consumption too high
7. Engine pings when accelerating
8. Backfiring
9. Engine becomes too hot

|   |   |   |   |   |   |   |   |   | <u>Cause of trouble</u>                      | <u>Test instructions</u>   | <u>Coordinate</u> |
|---|---|---|---|---|---|---|---|---|--|--|-------------------|
|   |   | ● | ● | ● | ● |   |   |   | Interference-suppression resistors defective | Assess using ignition oscillogram or perform resistance measurement                                      | -                 |
|   | ● | ● | ● |   | ● | ● | ● | ● | Centrifugal advance defective                | See Autodata test specifications   | -                 |
|   |   | ● | ● |   | ● | ● |   | ● | Vacuum advance defective                     | See Autodata test specifications   | -                 |
| ● |   |   |   |   |   |   |   |   | Trigger box defective                        | Test trigger box output stage, test primary voltage  | B 13.<br>B 15     |
| ● |   |   |   |   |   |   |   |   | Ignition distributor pickup system defective | Pick-up resistance, pick-up winding short-circuit to ground, check pick-up system for mechanical damage. | C 1               |
| ● | ● | ● | ● | ● |   |   |   |   | Engine-speed limiter defective               | Test cut-out speed, or perform visual examination.   |                   |
| ● |   |   |   |   |   |   |   |   | Firing sequence incorrect                    | See Autodata test specifications   |                   |

**A5**

Rapid diagnosis chart  
Opel



**A6**

Rapid diagnosis chart  
Opel



## 2. Test specifications

|                         |                       |
|-------------------------|-----------------------|
| Ignition coil primary   | 0.3...0.6 $\Omega$    |
| Ignition coil secondary | 7.3...14.6 k $\Omega$ |

**B5**

|                               |                    |
|-------------------------------|--------------------|
| Ballast resistor 0.4 $\Omega$ | 0.3...0.5 $\Omega$ |
| Ballast resistor 0.6 $\Omega$ | 0.5...0.7 $\Omega$ |

|                                   |                    |
|-----------------------------------|--------------------|
| Voltage drop                      | ~ 1.7 V            |
| Ignition coil with<br>ignition on | at $U_B \geq 11$ V |

**B7**

|                              |             |
|------------------------------|-------------|
| Voltage supply               | max. 1.0 V  |
| trigger box with ignition on | below $U_B$ |

|                                    |                 |
|------------------------------------|-----------------|
| Dwell angle at                     |                 |
| $n = 1500 \pm 50 \text{ min}^{-1}$ | 33-51° (55-85%) |
| $n = 5000 \pm 50 \text{ min}^{-1}$ | 45-55° (75-92%) |

**B11**

|  |          |
|--|----------|
| Trigger box output stage<br>with ignition on | max. 2 V |
|--|----------|

**B13**

|                                       |             |
|---------------------------------------|-------------|
| Primary voltage with<br>engine idling | 100...180 V |
|---------------------------------------|-------------|

**B15**

|                               |                    |
|-------------------------------|--------------------|
| Resistance of coil<br>section | 485...850 $\Omega$ |
|-------------------------------|--------------------|

**C1**

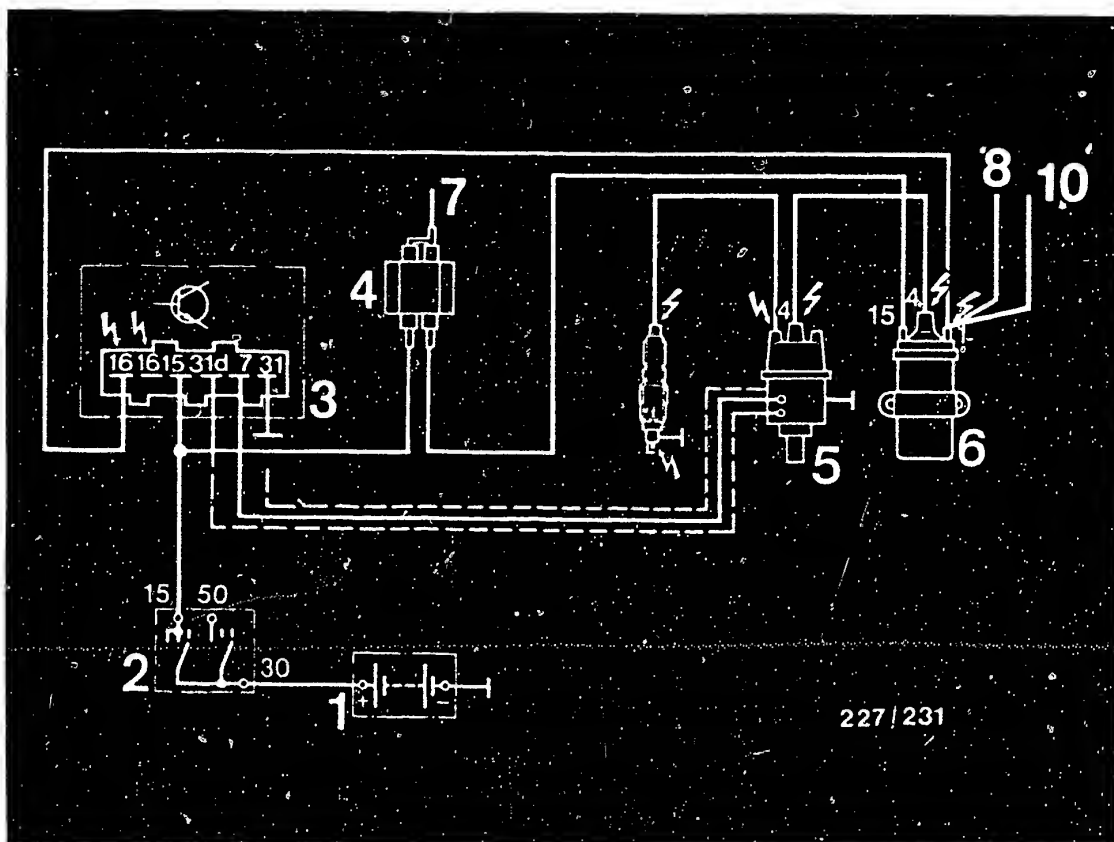
|  |              |
|--|--------------|
| Short circuit to ground<br>of coil section | $R = \infty$ |
|--|--------------|

See Autodata test specifications for settings for  
ignition, idle speed, exhaust gas, valve clearance  
etc.

**A7**

Test specifications  
Opel



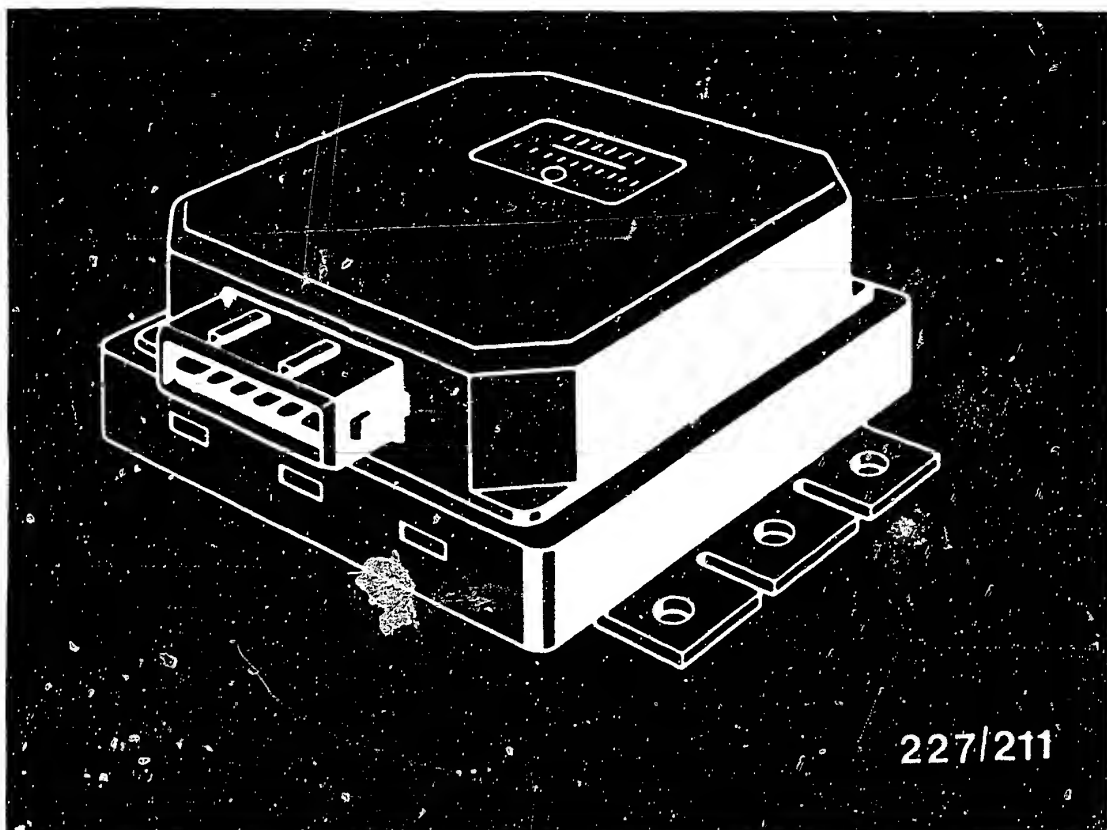


- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor

- 6 = Ignition coil
- 7 = to starting motor term. 15 a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1

⚡ = Dangerous voltages (400 V - 25 kV)

### 3. Electrical terminal diagram



TCI trigger box

#### 4. Installation position of components

The trigger box is in the engine compartment (near engine mounting on left-hand side in forward direction of travel).



## 5. Necessary test equipment, aids

|  |                           |  |
|--|---------------------------|--|
| Motortester  | MOT 002.00                | 0 684 000 201                              |
| Spark gap e.g. Ignition<br>coil and condenser tester<br>or | EFAW 106 A                | 0 681 100 001                              |
| Single spark gap   | EF 1177/7                 | 1 684 531 000                              |
| 5 kΩ sleeve-type suppressor                                |                           | 0 356 500 001                              |
| Ohmmeter<br>or e.g.  | ETE 014.00<br>Pontavi Wh2 | 0 684 101 400<br>Commercially<br>available |
| Voltmeter e.g.   | ETE 014.00                | 0 684 101 400                              |
| Test prods   |                           | Commercially<br>available                  |





## 6. Danger of accident on electronic ignition systems

Increased demands of modern engines on the ignition system combined with the desire for freedom of maintenance have recently led to electronic ignition systems being fitted as standard. Usually the ignition power of electronic systems (of almost all manufacturers) is higher than that of conventional systems, and there are signs of further increases in power. Electronic ignition systems thus reach a power range which can be highly dangerous if live parts or terminals are touched (both on the primary as well as the secondary sides).

In this connection we should like to point out that the VDE regulations, in particular VDE 0104/7.67 and/or the respective national regulations must be followed when testing or working on the ignition system.

The ignition should always be switched off when working on the ignition system (switch off ignition or voltage source). Such work includes:

- Connecting of engine test equipment (timing light, dwell-tach tester, ignition oscilloscope, etc.).
- Replacing parts of the ignition system (spark plug, ignition coil, ignition distributor, H.T. ignition cable, etc.).



If, while testing the ignition system or during adjustment work on the engine (e.g. carburettor), it becomes necessary to switch on the ignition (switch on ignition or voltage source), the above-mentioned dangerous voltages occur over the entire system.

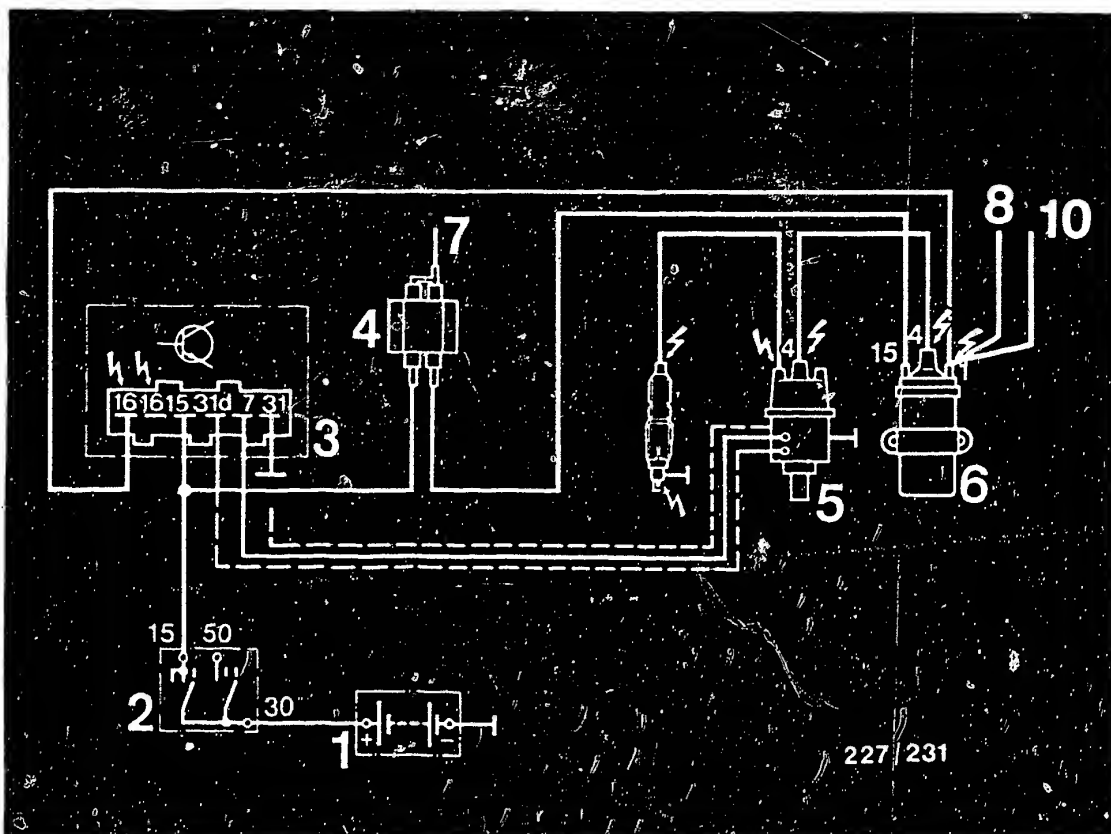
The danger of accident exists, therefore, not only on the individual assemblies of the ignition system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e.g. tachometer connection, diagnostic plug), at plug-in connections and test equipment.

**A12**

Danger of accident

Open





- |                                  |                                    |
|----------------------------------|------------------------------------|
| 1 = Battery                      | 6 = Ignition coil                  |
| 2 = Ignition and starting switch | 7 = To starting motor terminal 15a |
| 3 = Trigger box                  | 8 = to tachometer                  |
| 4 = Ballast resistor             | 10 = to L-Jetronic term. 1         |
| 5 = Ignition distributor         |                                    |

⚡ = Dangerous voltages (400 V - 25 kV)

### Electrical terminal diagram

The dangerous locations are marked with danger arrows taking the example of the terminal diagram of an electronic ignition system.

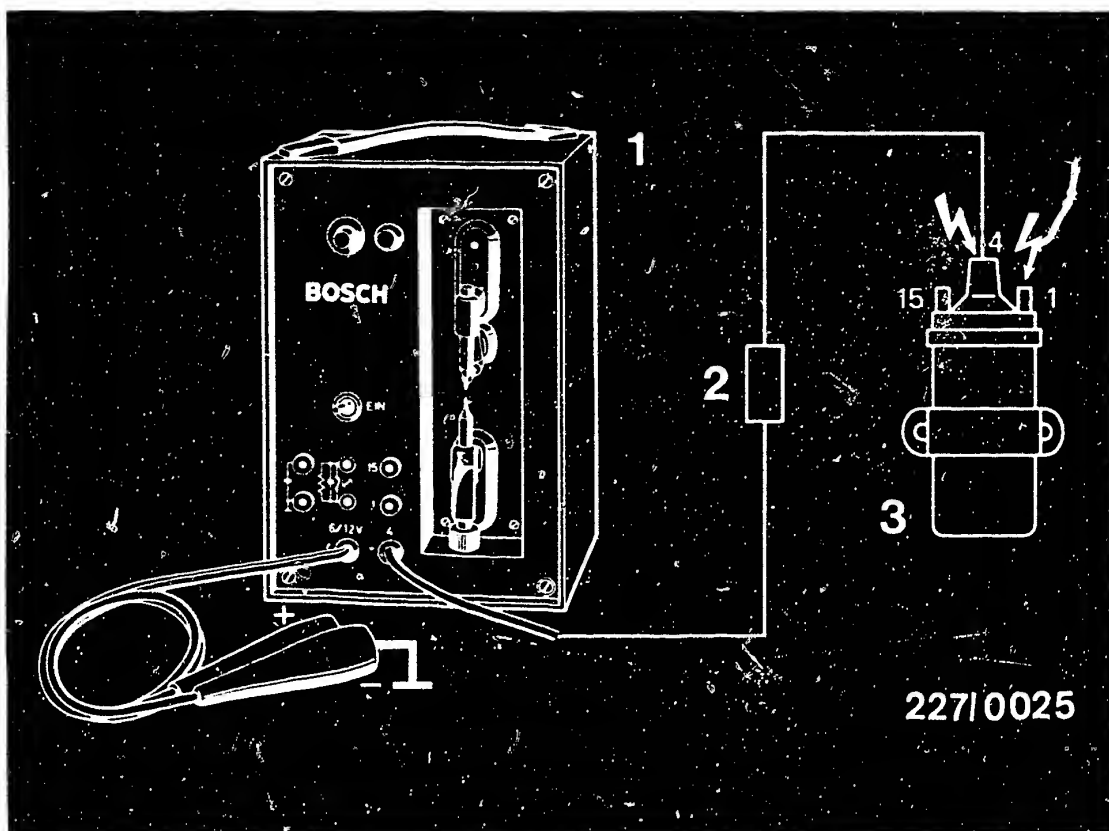
## 7. Important vehicle information

- During the compression test, either pull off the trigger-box plug or firmly connect terminal 4 of the ignition coil to ground using an extra cable (dangerous voltages, insulation damage at ignition coil, ignition distributor or ignition harness).


Note: The extra cable must be suppressed with at least 2 k $\Omega$  , e.g. with the interference suppression sleeve (5 k $\Omega$ ) 0 356 500 001.

- Resistance measurements must only be performed with the ignition switched off or with the battery disconnected (measuring instrument defective).
- In order to prevent the trigger box from being irreparably damaged, the secondary side of the ignition system must have at least 2 k $\Omega$  interference suppression.





- 1 = spark gap
- 2 = 5 k $\Omega$  sleeve-type suppressor
- 3 = ignition coil

 = dangerous voltages (400 V - 25 kV)

- In order to prevent the trigger box from being irreparably damaged, when using a spark gap, an interference-suppression resistor of at least 2 k $\Omega$  must be connected between the spark gap and ignition coil terminal 4, e.g. sleeve-type suppressor (5 k $\Omega$ ) 0 356 500 001.
- In the case of ignition distributors with engine-speed limitation the ignition distributor side terminal 4 must have 1 k $\Omega$  interference suppression. Operation without interference suppression will lead to the destruction of the trigger box.

- The holding springs of the distributor cap must not drop into the pickup system when the engine is being cranked and with the dust-protection cover removed.
- Do not disconnect the battery while the engine is running.
- Incorrect battery polarity will lead to the destruction of the trigger box and ignition coil.
- Do not use a starting aid with more than 16 V or a fast charger for starting.
- The specified ignition coil (see Part No.) must not be replaced with a different ignition coil.
- No suppression capacitor must be connected to ignition coil terminal 1 and terminal 15.
- No battery (+) or test lamp must be connected to ignition coil terminal 1 (trigger box will be destroyed).
- The lead between induction-type pulse generator and trigger box must be shielded (malfunction of trigger box).



## 8. Trouble-shooting program

### Procedure

The trouble-shooting program is divided into 3 rows of boxes.

The left-hand row contains test instructions and test specifications.

The center row contains repair instructions.

The right-hand row contains the illustrations/terminal diagrams belonging to the text and the explanation of the items in the picture.

If the questions asked in the left-hand row can be answered conclusively with "Yes", then proceed to the next test down.

If the answer to the question is "No", branch to the center row and carry out the tests given there.

Before testing, make sure of the following:

Battery fully charged, fuel system O.K., engine mechanically O.K. (e.g. compression, valve clearance etc.). Ambient temperature/ignition system temperature 0° to ±100.°C (temperature has a considerable effect on measured values).



## Beginning of trouble-shooting program

Starting motor operates, engine fails to start or misfires or lacks power.

Yes

Continued on B 3

**B2**

Trouble-shooting program

Open





yes

Test primary voltage. If no oscilloscope or tachometer is available, check whether there is an ignition spark across the spark gap.

no

If no primary voltage or no ignition spark, continue testing at C 1.

Testing as from B 5 not necessary.

Primary voltage with oscilloscope

Connect oscilloscope to ignition coil according to operating instructions. Start the engine. Oscilloscope must show a primary voltage (of any value).

Primary voltage with tachometer tester

Connect tachometer tester to ignition coil according to instructions.

Start the engine.

Tachometer tester must indicate a value (any value).

Ignition spark with spark gap

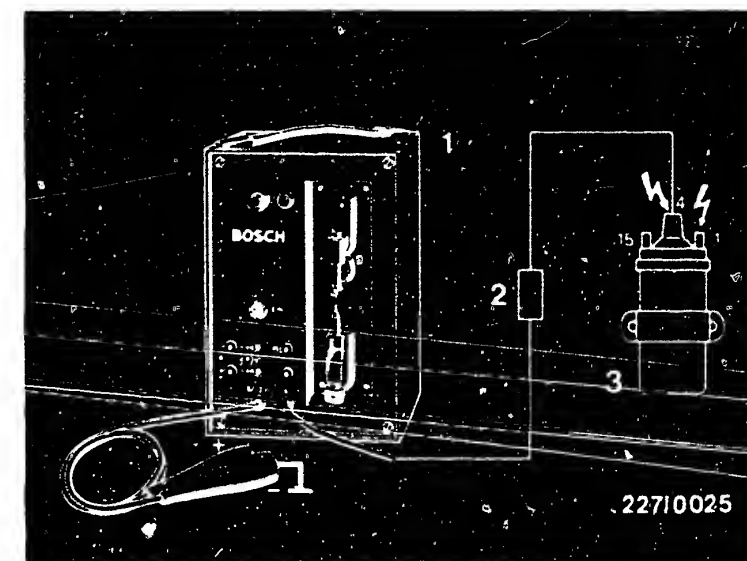
Disconnect ignition cable 4 from ignition coil.

Connect the spark gap including sleeve-type suppressor (5 k $\Omega$ ) to ignition coil. Adjust spark gap to 5 mm. Start the engine. There must be sparks across the spark gap.

Primary voltage on oscilloscope or ignition sparks across spark gap?

yes

Continued on B5/6



1 = spark gap

2 = 5 k $\Omega$  sleeve-type suppressor

3 = ignition coil

⚡ = dangerous voltages

**B3**

Trouble-shooting program

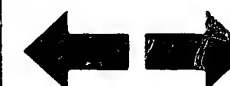
Opel

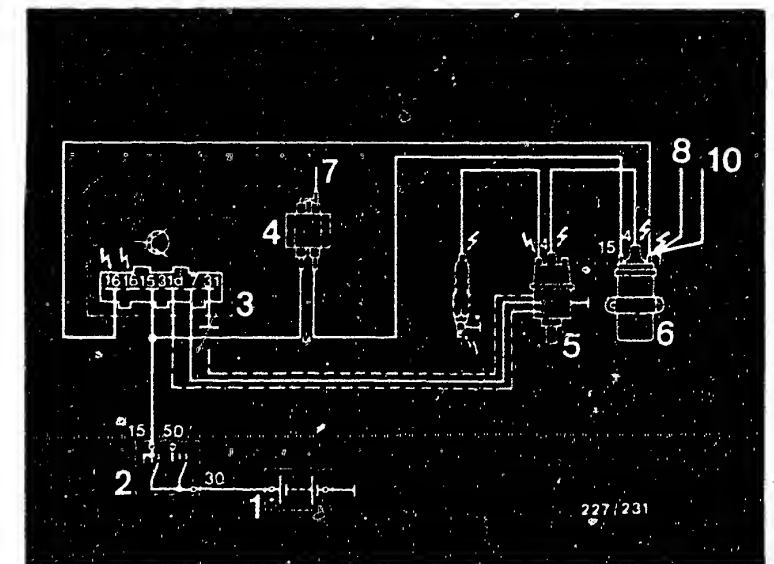
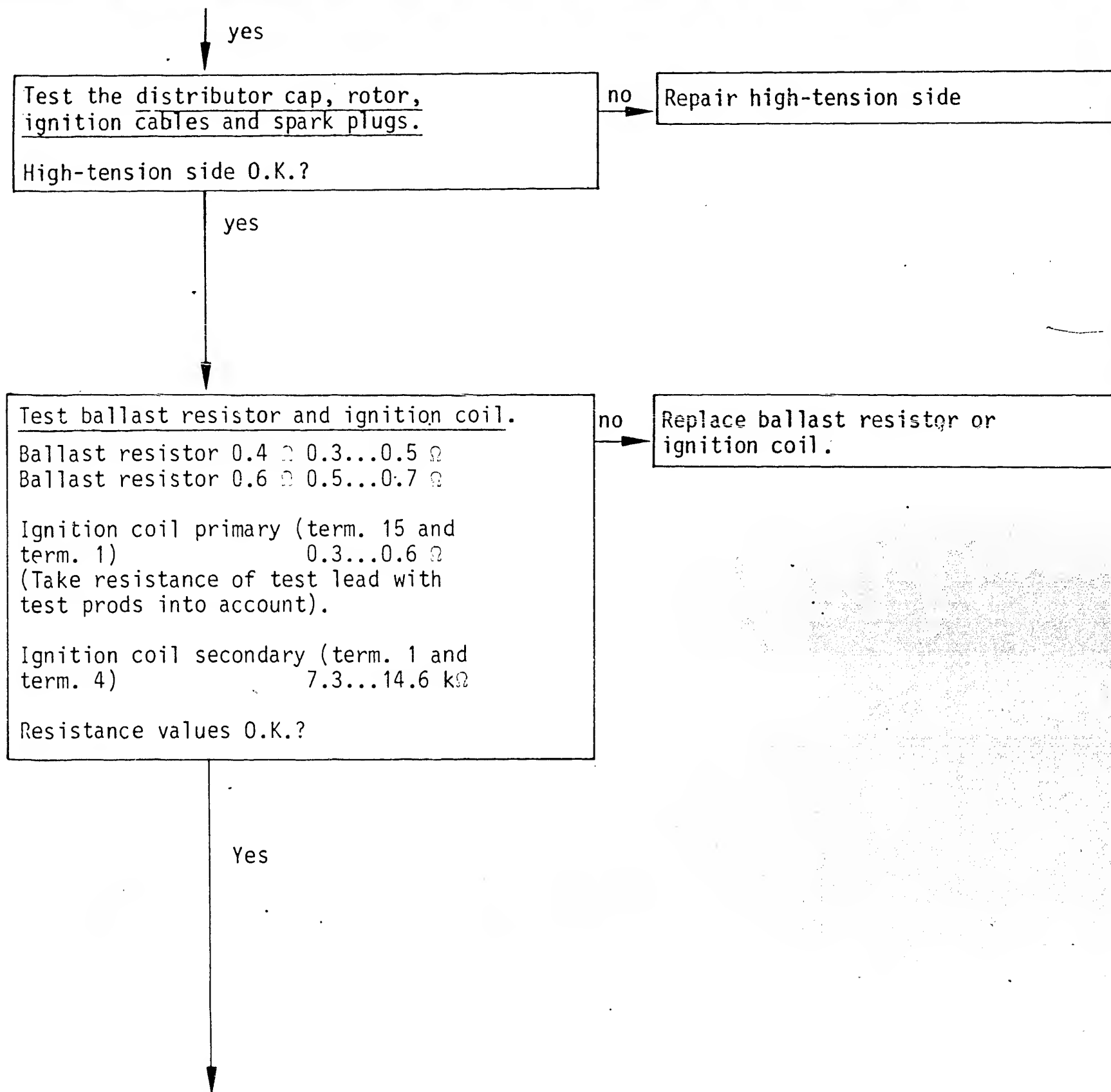


**B4**

Trouble-shooting program

Opel





- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = to starting motor term. 15 a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1
- ⚡ = Dangerous voltages (400 V - 25 kV)

**B5**

Trouble-shooting program

Opel

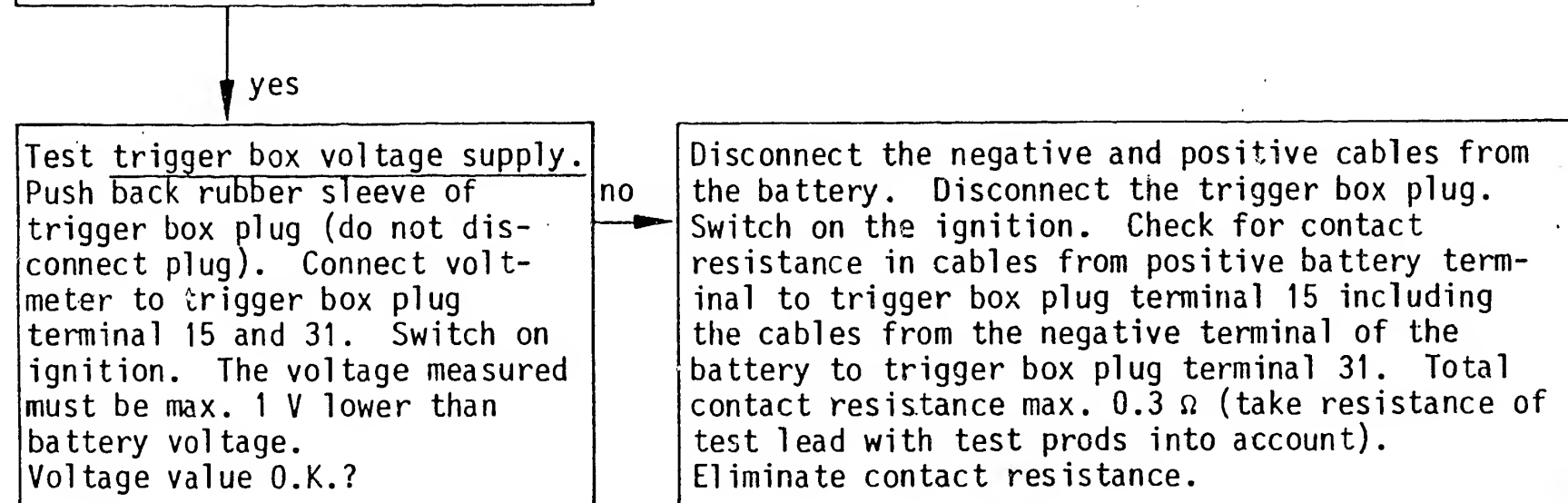
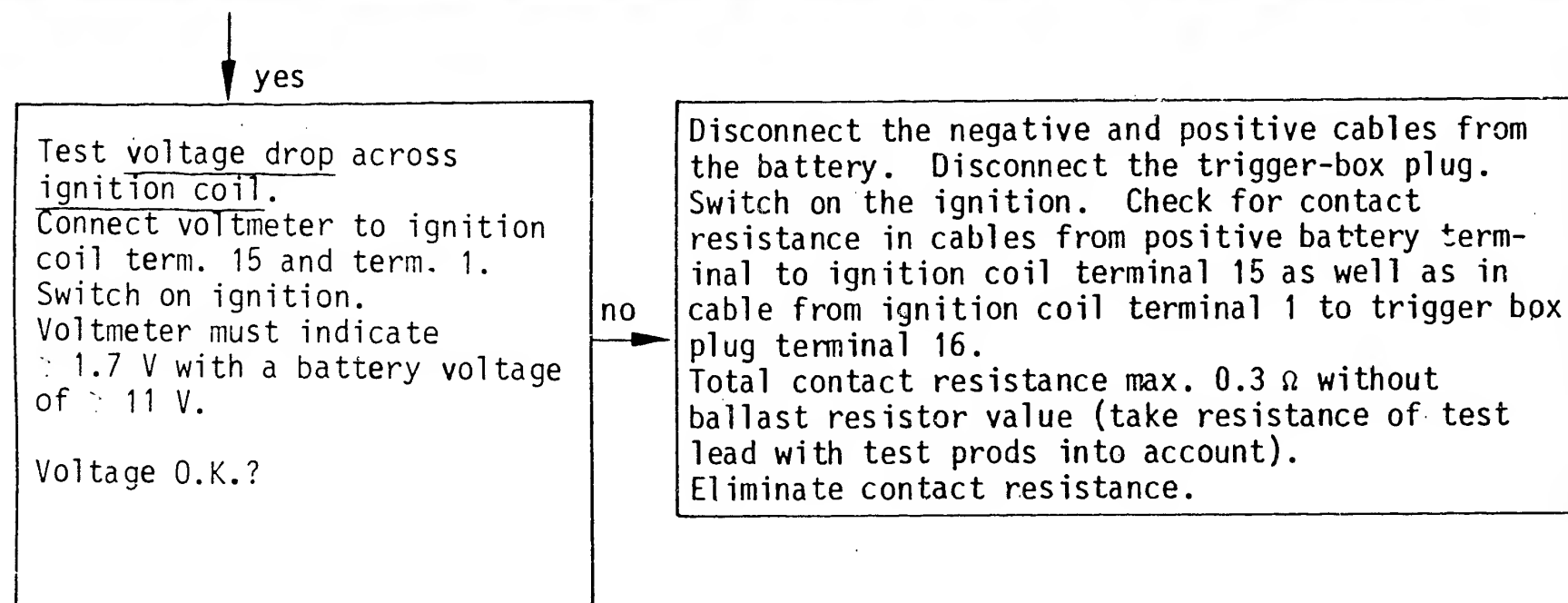


**B6**

Trouble-shooting program

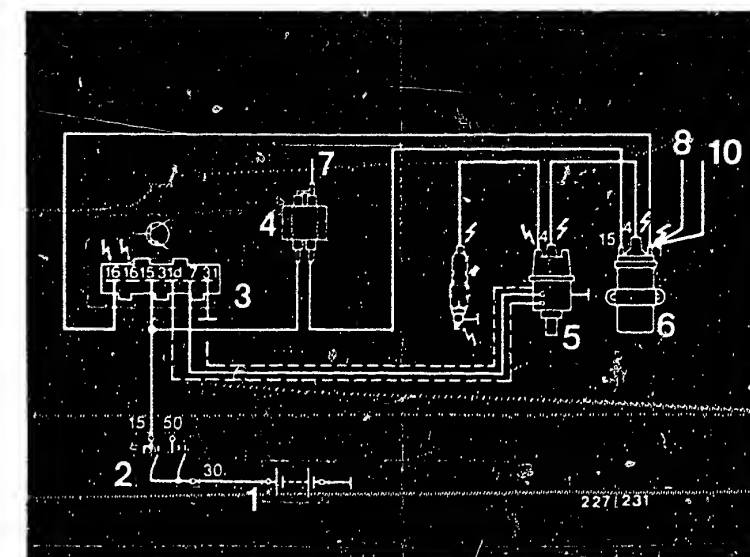
Opel



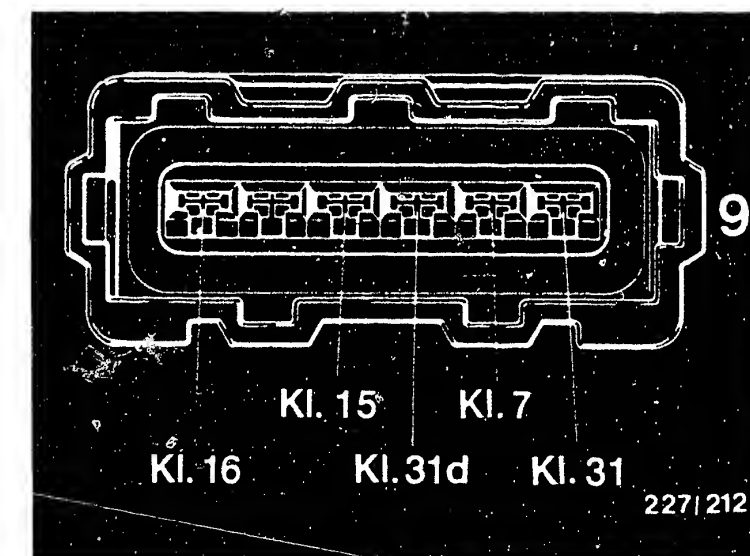


yes

Continued on B9/B10



- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = To starting motor terminal 15a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1
- ⚡ = Dangerous voltages (400 V - 25 kV)
- 9 = Trigger box plug



**B7**

Trouble-shooting program

Opel

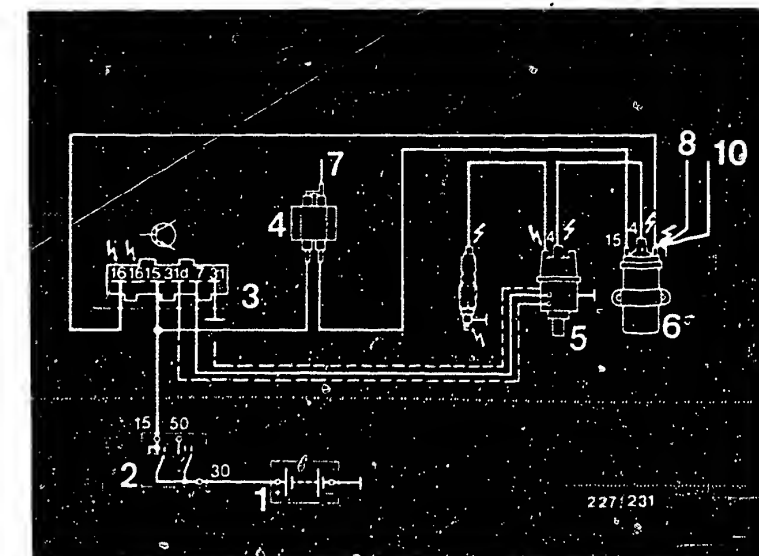
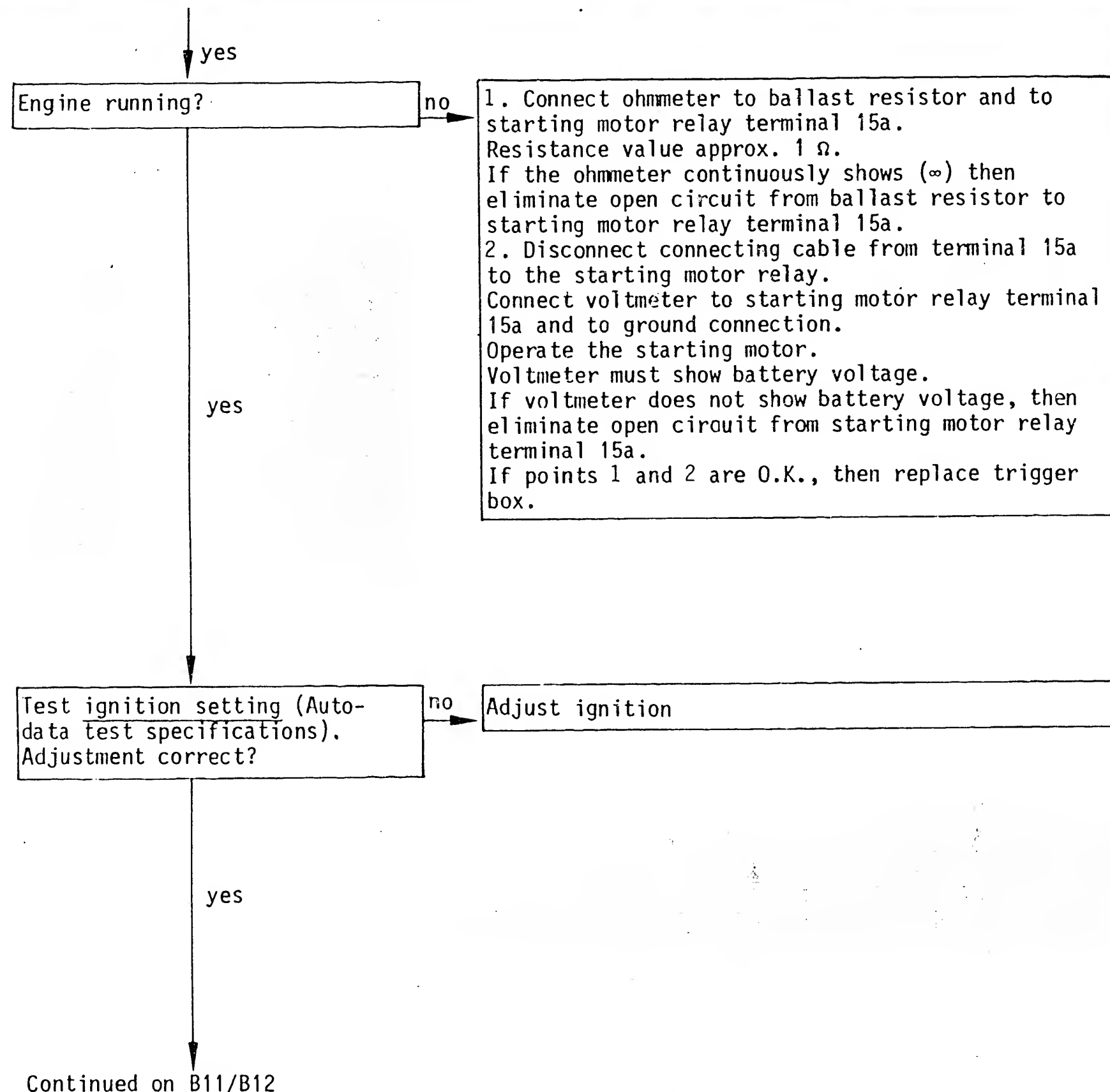


**B8**

Trouble-shooting program

Opel





- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = To starting motor terminal 15a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1
- ⚡ = Dangerous voltages (400 V - 25 kV)

**B9**

Trouble-shooting program  
Opel



**B10**

Trouble-shooting program  
Opel



yes

Test dwell angle (only for a short period and with warm engine).  
Connect the dwell-angle tester to the ignition coil according to the instructions.  
Start the engine.  
 $n = 1500 + 50 \text{ min}^{-1}$   
 $33^\circ \dots 51^\circ$  (55...85%)  
 $n = 5000 + 50 \text{ min}^{-1}$   
 $45^\circ \dots 55^\circ$  (75...92%)  
Dwell angle O.K.?

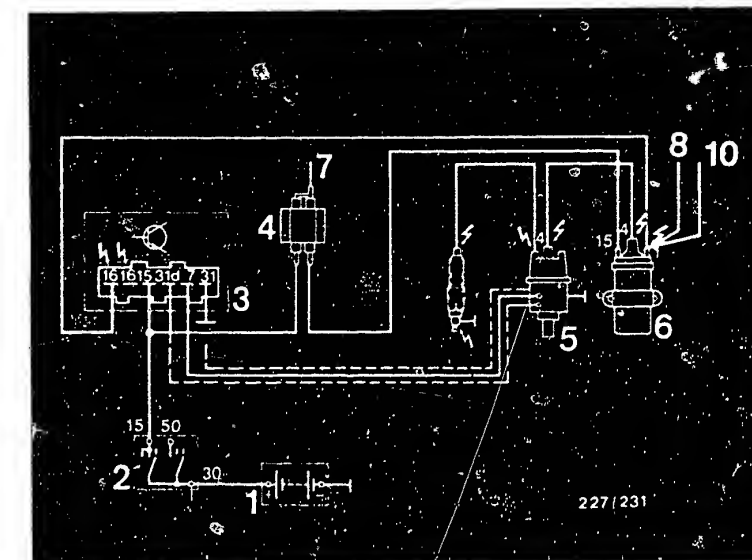
no

yes

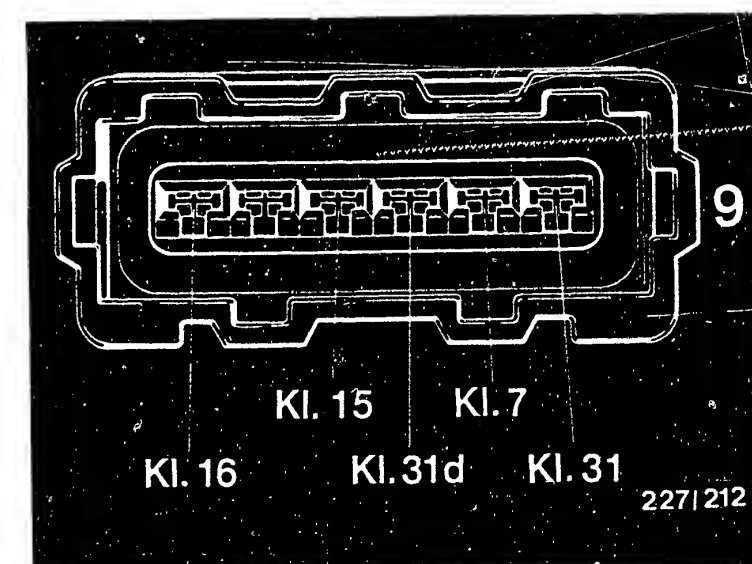
1. Test resistance on coil section including electric cable.  
Disconnect trigger box plug.  
Connect ohmmeter to the disconnected trigger box plug between terminal 7 and 31d.  
Ohmmeter must show 485...850  $\Omega$ .  
If resistance value is not O.K., then replace coil section/ignition distributor or electric cable.

2. Test the ground connection of the coil section and electric cable.  
Connect the ohmmeter to the disconnected trigger box plug at terminal 7 or 31d and to ground connection. The ohmmeter must show ( $\infty$ ) continuously.  
If resistance value is not O.K., then replace coil section/ignition distributor or electric cable.

3. Test pickup assembly to see if there is mechanical damage.  
Visual test: timer core must not rub against the teeth of the pickup assembly.  
If pickup assembly is not O.K., then replace pickup assembly/ignition distributor.  
If points 1 - 3 are O.K., then replace trigger box.



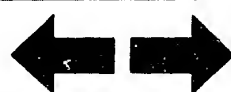
- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = To starting motor terminal 15a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1
- ⚡ = Dangerous voltages (400 V - 25 kV)
- 9 = Trigger box plug



Continued on B13/B14

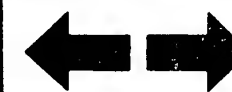
B11

Trouble-shooting program  
Opel



B12

Trouble-shooting program  
Opel



yes

Test trigger box output stage.

Connect voltmeter to ignition coil terminal 1 and ground. Switch on ignition. The voltage measured must be max. 2 V.

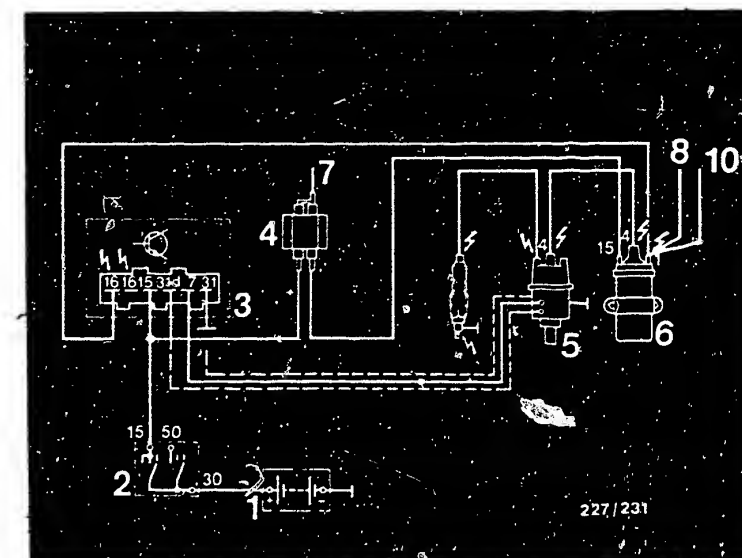
Voltage value O.K.?

no

Replace trigger box

yes

Continued on B15/B16



- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = To starting motor terminal 15a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1
- ⚡ = Dangerous voltages (400 V - 25 kV)

**B13**

Trouble-shooting program

Opel



**B14**

Trouble-shooting program

Opel





yes

Test the primary voltage (if MOT 002.00 is available).  
Connect oscilloscope (MOT 2 01) to ignition coil according to instructions.  
Run engine at idle.  
The primary voltage measured must be 100...180 V. See diagram.  
Voltage value O.K.?

no

Replace trigger box.

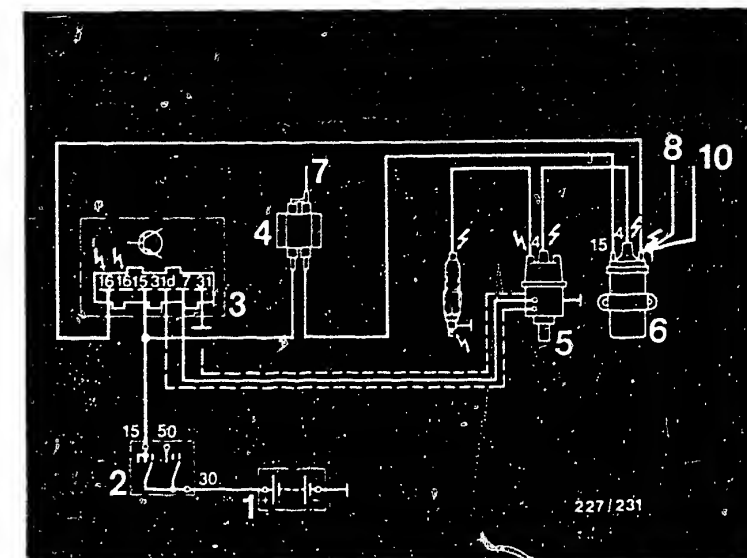
yes

Ignition system O.K. Test completed.

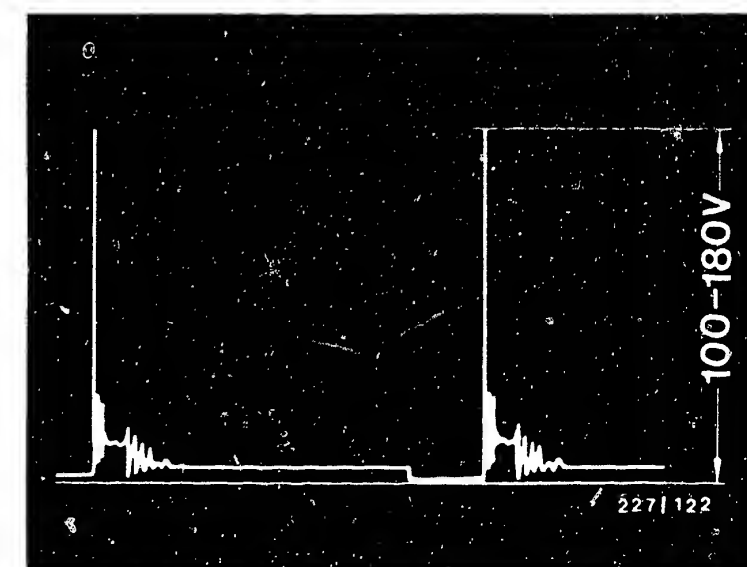
Tests as from C 1 no longer necessary.

Please note:

If the cause of the customer's problem is not eliminated, then there are further faults in the fuel system or the engine is not mechanically O.K.

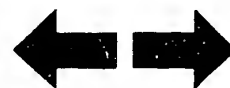


- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = To starting motor terminal 15a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1
- ⚡ = Dangerous voltages (400 V - 25 kV)



**B 15**

Trouble-shooting program  
Opel



**B 16**

Trouble-shooting program  
Opel



No primary voltage or no ignition spark.  
(Continued from B3)

yes

Test resistance of coil section including electric cable.  
Disconnect trigger box plug.  
Connect ohmmeter to the disconnected trigger box plug between terminal 7 and 31d.  
Ohmmeter must show 485...850  $\Omega$ .  
Resistance value O.K.?

no

Replace coil/section/ignition distributor or electric cable.

yes

Test ground connection of coil element and electric cable.  
Connect ohmmeter to disconnected trigger box plug at terminal 7 or 31d and ground connection. Ohmmeter must show ( $\infty$ ) continuously.  
Resistance value ( $\infty$ ) O.K.?

no

Replace coil section/ignition distributor or electric cable.

yes

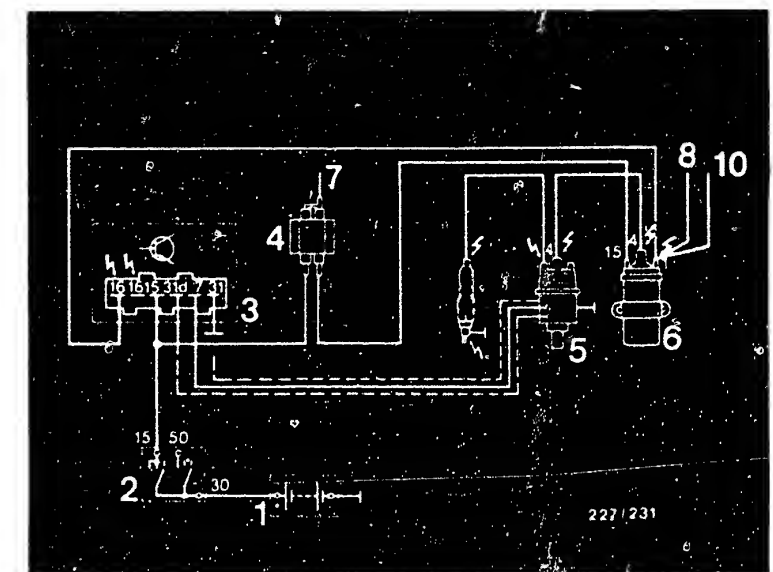
Test pickup assembly to see if there is mechanical damage.  
Visual test: timer core must not rub against the teeth of the pickup assembly. Pickup assembly O.K.?

no

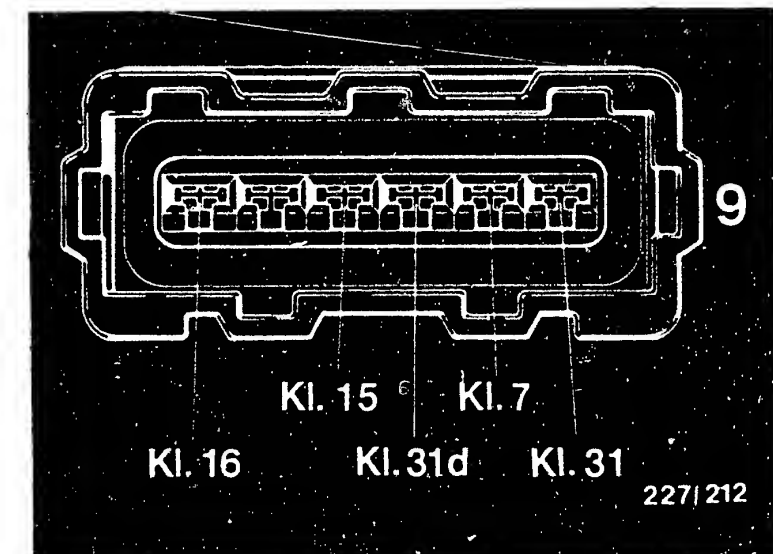
Replace pickup assembly/ignition distributor.

yes

Continued on C3/C4



- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = To starting motor terminal 15a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1
- ⚡ = Dangerous voltages (400 V - 25 kV)
- 9 = Trigger box plug



C1

Trouble-shooting program  
Opel

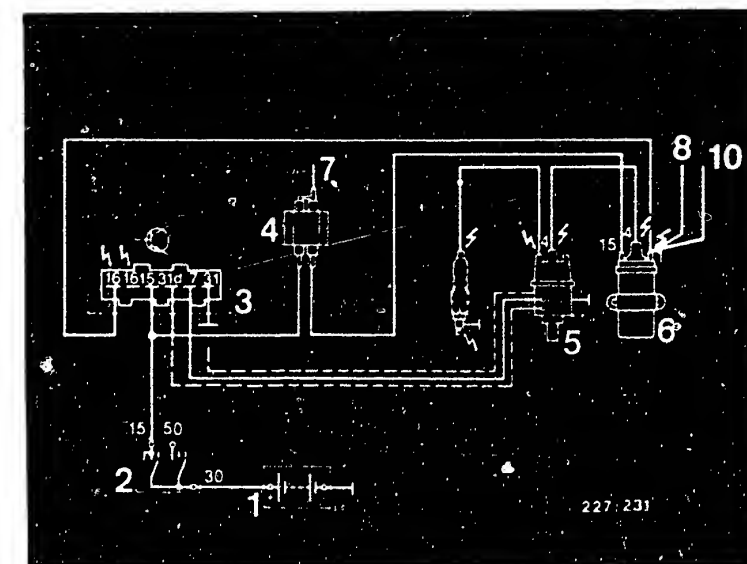
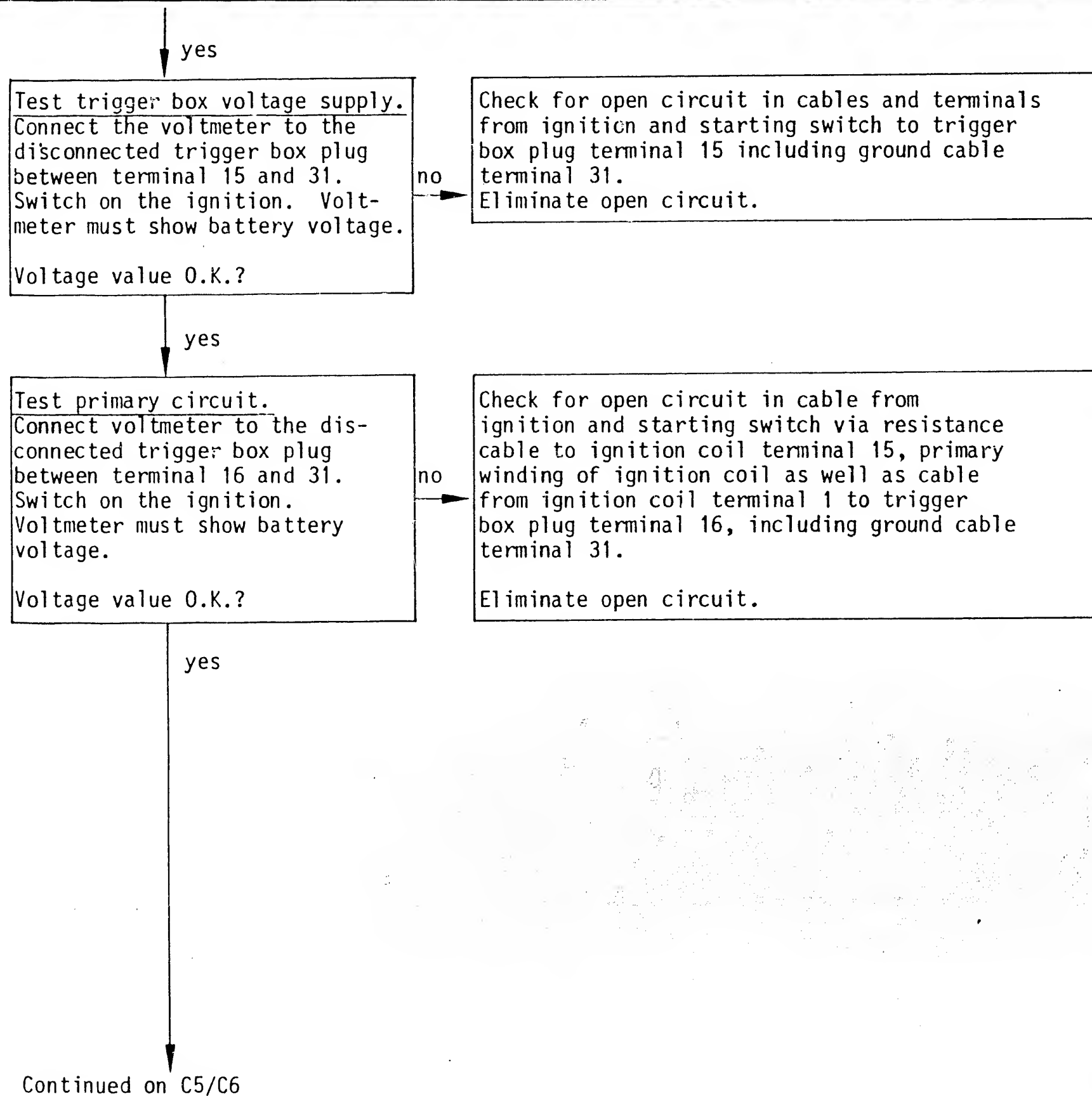


C2

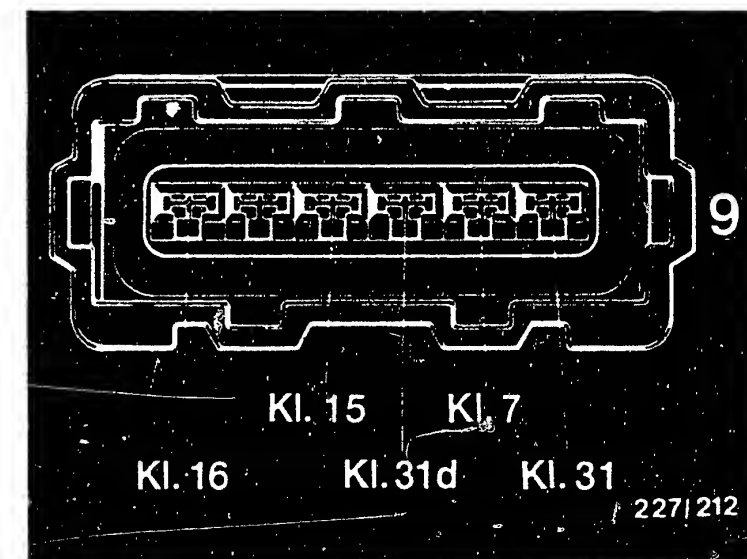
Trouble-shooting program  
Opel







- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = To starting motor terminal 15a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1
- ⚡ = Dangerous voltages (400 V - 25 kV)
- 9 = Trigger box plug



Yes

Test ballast resistor and ignition coil.

Ballast resistor 0.4  $\pm$  0.3...0.5  $\Omega$

Ballast resistor 0.6  $\pm$  0.5...0.7  $\Omega$

Ignition coil primary (term. 15 and term. 1) 0.3...0.6  $\Omega$   
(Take resistance of test lead with test prods into account).

Ignition coil secondary (term. 1 and term. 4) 7.3...14.6 k $\Omega$

Resistance values O.K.?

No

Replace ballast resistor and/or ignition coil.

Yes

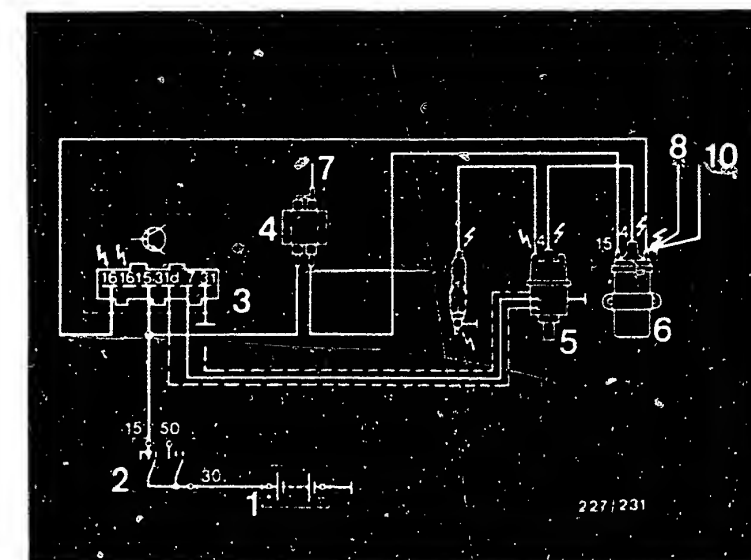
Replace trigger box.

Testing completed.

Tests from B 5 onward not necessary.

Note:

If customer complaint still not remedied, there may be faults in the fuel system or engine not mechanically O.K.



- 1 = Battery
- 2 = Ignition and starting switch
- 3 = Trigger box
- 4 = Ballast resistor
- 5 = Ignition distributor
- 6 = Ignition coil
- 7 = to starting motor term. 15 a
- 8 = to tachometer
- 10 = to L-Jetronic term. 1

⚡ = Dangerous voltages  
(400 V - 25 kV)

C5

Trouble-shooting program

Open



C6

Trouble-shooting program

Open



# After-sales Service

## Technical Bulletin

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22

### Danger of Accident on Semi-conductor Ignition Systems

VDT-I-227/102 B

11.1976

Please be sure to pass this bulletin on to your employees for their attention.

The increased demands made on their ignition systems by modern engines, and the wish for freedom from maintenance, led some time ago to manufactures starting to equip their vehicles with semi-conductor ignition systems as original equipment. In most cases the performance of nearly all makes of such systems is higher than that of conventional systems, and further improvements are to be expected. This means that semi-conductor ignition systems have reached the point where contact with "live" parts or contacts (whether on the primary side or the secondary side) can prove fatal.

In this connection we should like to point out to you that the laws valid in your country regarding work on high-voltage systems must be adhered to when working on, or testing, semi-conductor ignition systems.

As a matter of principle, when working on such ignition systems the ignition is to be switched off. Included in such work are the following operations:

- Connection of engine testing equipment (timing light, dwell-toch tester, ignition oscilloscope etc.).
- Replacement of ignition system parts (spark plugs, ignition coil, ignition distributor, H.T. ignition cables etc.).

If it is necessary to switch on the ignition in order to test the system or make adjustments on the engine (to the carburetor for instance), then lethal voltages are present throughout the entire system.

This means that the danger of accident exists not only at individual components in the system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also at the wiring harness (e.g. connection for the tachometer, diagnostic connector), on terminals, and on test equipment.

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L1

Technical Bulletin

Opel

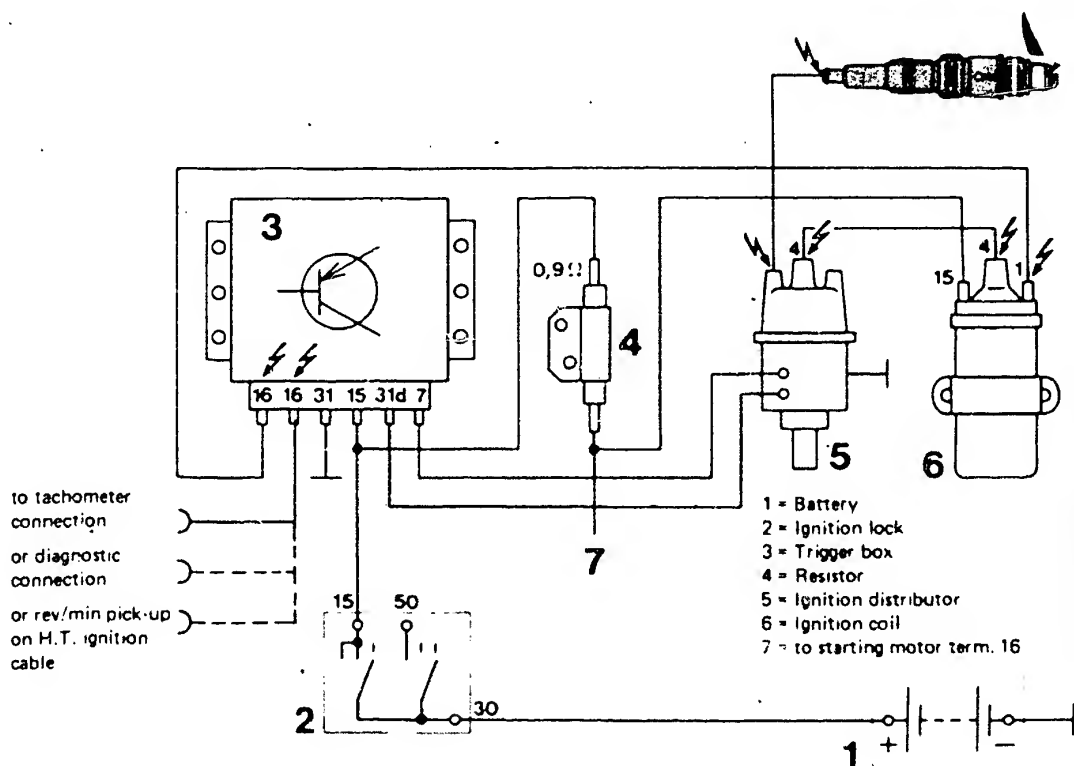


In addition, in the case of the capacitor-discharge ignition system (CDI), danger of accident is also present under the following circumstances:

- Operation of the trigger box without the ignition transformer.
- At the trigger box, (removed), relatively soon after it has been switched off (capacitor discharge).

Below is a typical terminal diagram of a semi-conductor ignition system, the danger points are marked with red high-voltage arrows. We would point out that all semi-conductor ignition systems, even the older ones, are to be regarded as dangerous in the sense as defined by this bulletin.

Please address any queries or comments concerning the contents of this publication to our representative in your country.



Terminal diagram

# After-sales Service

## Technical Bulletin

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EFFECTS OF ELECTRICAL AND ELECTRONIC  
SYSTEMS ON HEART PACEMAKERS

VDT-I-227/107 En

1.1981

e.g. ignition systems, Jetronic, Motronic, ABS

Please ensure without fail that this Bulletin is passed on to your employees for their attention!

We have often been asked by some of our customers whether or not patients with heart pacemakers are endangered in any way by ignition systems. This theme was recently the subject of an examination carried out by the Ignition System Development Department of Robert Bosch GmbH in conjunction with Dr. Thull, lecturer at the Central Institute for Biomedical Technology at the University of Erlangen-Nürnberg and Biotronic GmbH & Co. of Berlin, a manufacturer of heart pacemakers. The magazine "Biomedizinischen Technik" (5/80) listed the results.

The most important discoveries in this practice can be summarized from the examination report as follows:-

1. Heart pacemakers corresponding to the latest state of the art are not affected by radiation (electromagnetic fields) from ignition systems.
2. With a stationary engine and the ignition switched off the heart pacemaker is not affected by any part of the ignition system, even when unintentionally touched. Maintenance work in the engine compartment, for example, can then be carried out without any danger.
3. With the engine running or stationary with the ignition switched on, touching current-carrying parts of the ignition system, as well as parts of any other electrical system, presents a certain danger for everybody. The heart pacemaker can here be affected under certain conditions (voltage, current and frequency).  
Patients with heart pacemakers should therefore at all costs avoid touching current-carrying parts of electrical systems.
4. Furthermore, patients with heart pacemakers are more inclined to psychic shock effects than other people, even when they receive just a harmless electric shock, because many such patients are conscious of the increased danger to the cardiac activity.

We therefore consider it inadvisable for patients with heart pacemakers to be employed in workshops or on vehicles where ignition systems are being tested or repaired. If any members of your staff have heart pacemakers please carry out the necessary measures.

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**L3**

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We would like to add that heart pacemakers are not expected to be affected in any way by interference from other electronic products and systems which we manufacture, such as the Antiskid System (ABS), Jetronic, Motronic, because the much greater radiation intensity of the ignition systems examined in normal use has not caused any interference to heart pacemakers corresponding to the latest state of the art.

If you should receive questions on this matter from customers, please inform them accordingly.



# After-sales Service

## Technical Bulletin

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### NEW DESIGNATIONS FOR IGNITION SYSTEMS

VDT-I-227/108 En

1.1983

The introduction of new ignition systems has made it necessary to reclassify all designations.

The designations listed below will be used immediately in KH workshop and sales literature.

| Designation                                      | Abbrev'd code     | Meaning                          | Switching                      | Ignition control and spark advance   | High-voltage distribution            |
|--|-------------------|----------------------------------|--------------------------------|--------------------------------------|--------------------------------------|
| Coil ignition                                    | SZ<br>(CI)        | -----                            | Mechanical<br>(breaker points) | Mechanical<br>(ignition distributor) | Mechanical<br>(ignition distributor) |
| Transistorized coil ignition                     | TSZ-A<br>(TCI-c)  | A-breaker-triggered              | Electronic<br>(trigger box)    | Mechanical<br>(ignition distributor) | Mechanical<br>(ignition distributor) |
| Trigger box with conventional circuit techniques | TSZ-I*<br>(TCI-i) | I=Induction-type pulse generator | Electronic<br>(trigger box)    | Mechanical<br>(ignition distributor) | Mechanical<br>(ignition distributor) |
|  | TSZ-H             | H=Hall generator                 | Electronic<br>(trigger box)    | Mechanical<br>(ignition distributor) | Mechanical<br>(ignition distributor) |
| Transistorized ignition                          | IZ-I*<br>(TI-i)   | I=Induction-type pulse generator | Electronic<br>(trigger box)    | Mechanical<br>(ignition distributor) | Mechanical<br>(ignition distributor) |
| Trigger box in Hybrid technique                  | IZ-H*<br>(TI-h)   | H=Hall generator                 | Electronic<br>(trigger box)    | Mechanical<br>(ignition distributor) | Mechanical<br>(ignition distributor) |

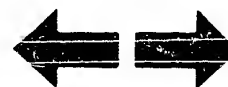
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**L5**

Technical Bulletin

Opel



| Designation  | Abbrev'd code | Meaning              | Switching                                | Ignition control and spark advance | High-voltage distribution   |
|--|---------------|----------------------|--|------------------------------------|---|
| Breakerless semiconductor ignition with or without knock control | EZ<br>EZ-K    | -<br>K=Knock control | Electronic (trigger box or control unit) | Electronic (control unit)          | Mechanical (ignition distributor or high-voltage distributor)                 |
| Distributorless ignition with or without knock control           | VZ<br>VZ-K    | -<br>K=Knock control | Electronic (control unit)                | Electronic (control unit)          | Electronic (dual-spark ignition coil, or 1 ignition coil for each spark plug) |

\*Note: The ignition system can also be equipped with a DLS unit (digital idle stabilization) or with an ELS unit (electronic idle stabilization) or with an ESV unit (electronic ignition retardation).





# After-sales Service

## Motor Vehicle Service Information

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TESTS ON ELECTRONIC IGNITION SYSTEMS  
(TCI, TZ)  
TESTER INSTRUCTIONS

VDT-I-Gen. 035 En  
3.1981

The following tests are listed in older and current Tester operating instructions or in Trouble-shooting with the oscillograph:

- "Separate ignition coil test" (concerns EFAW 213, 214, 268, AE 2000).
- "Calculating the "ignition voltage reserve" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).
- "Intensified insulation test" (concerns EFAW 213, 214, 268, AE 2000 and MOT series).

Nowadays transistorized ignition systems deliver more than 30,000 V secondary voltage.

To avoid damage to ignition coil, ignition cable and ignition distributor by voltage flashovers, the tests listed above should not be carried out on transistorized ignition systems.

The contents of this Service Information has already been published in the K7-Information K7-VJF 17/8012.

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Motor-Vehicle Information

Opel



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